

**FVDMS  
EMULEX VAX  
MSCP DISK PREPARATION UTILITY  
USER'S GUIDE**



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## **EMULEX PRODUCT WARRANTY**

**SOFTWARE WARRANTY:** Emulex warrants for a period of ninety (90) days, either from the date of installation or thirty (30) days after shipment, whichever comes first, that each software package supplied shall be free from defects and shall operate according to Emulex specifications under those Digital Equipment Corporation ("DEC") operating system versions supported by Emulex. Emulex does not warrant its software products under any operating system which has not been specifically identified. Any software revisions required hereunder will cover supply of distribution media only and will not cover on-site installation or integration.

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**RETURNED MATERIAL:** Warranty claims must be received by Emulex within the applicable warranty period. A replaced product, or part thereof, shall become the property of Emulex and shall be returned to Emulex at Purchaser's expense. All returned material must be accompanied by a RETURN AUTHORIZATION number assigned by Emulex.

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## 1.1 Introduction

---

FVDMS is an MSCP disk preparation utility designed for use with Emulex's VAX MSCP disk controllers and host adapters, as well as the Emulex Removable Disk Drive (EMR) Packaged Subsystem. The utility's basic function is to prepare a disk for use in a DEC operating system environment.

This utility is designed for use by qualified installers of Emulex equipment, and thus it assumes that you have some knowledge of hardware configurations, VAX/MicroVAX architecture and terminology, and interpretation of error messages and device register contents.

The document contains three main sections:

- |           |  |
|-----------|--|
| Section 1 | <b>General Description:</b> This section contains an overview of the FVDMS disk utility, including its functions, hardware and software compatibility requirements, distribution media, and related documentation. |
| Section 2 | <b>Operation:</b> This section describes the functions of FVDMS, procedures for using FVDMS, and FVDMS operations and options.   |
| Section 3 | <b>Service:</b> This section explains Emulex service policies.   |

---

## 1.2 Product Overview

---

FVDMS is an interactive, menu-driven utility. It allows you to perform the following basic operations to prepare the disk for use in a subsystem:

- Load/Edit NOVRAM (Emulex controllers only)
- Display current NOVRAM (Emulex controllers only)
- Format (Emulex controllers only)
- Format and Verify (Emulex controllers only)
- Verify
- Read only (media verification)
- List attached devices
- Replace a bad block

For details on these features, see Program Options, subsection 2.5.

One of the benefits of this program is that it limits user input requests to those appropriate to attached devices. Also, none of the program's operations that alter data either on the disk or in the NOVRAM are ever performed without your confirmation. Error printouts are as descriptive as possible. They contain the SCSI error status bytes or the MSCP error status (along with an English text description in some cases), and other status information appropriate to the attached devices.

This release of FVDMS has been tested with and supports all Emulex MSCP disk controllers, as well as the UC04 and UC14 Host Adapters attached to Adaptec ACB4000 series, Iomega Alpha 10.5 device controllers, and Emulex MD21/S2 and MD23 disk controllers used in EMR.

---

### **1.3 Distribution Media**

---

The following table lists and describes distribution media for FVDMS:

Kit Number	Emulex P/N	Description
VX9951801-01	VX9960406-01	TU58 cassette for VAX 730 and 750
	VX9960406-02	TU58 cassette for VAX 730 and 750
	VX9960405-00	TU58 cassette for VAX 730 and 750
VX9951801-02	VX9960506-01	8-inch floppy disk for VAX 750 and 780
	VX9960506-02	8-inch floppy disk for VAX 750 and 780
	VX9960505-00	8-inch floppy disk for VAX 750 and 780
VX9951804-01	VX9960704-01	5.25-inch floppy for MicroVAX
	VX9960704-02	5.25-inch floppy for MicroVAX
VX9951804-02	VX9962004-00	TK50 cartridge for MicroVAX
VX9951805-00	VX9960910-00	9-track mag tape for VAX-8600

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## **1.4 Compatibility**

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This section describes the hardware and software requirements of FVDMS.

---

### **1.4.1 Hardware**

---

FVDMS runs on any VAX 11/7xx, VAX 8600, VAX 8650, or MicroVAX system which has the following minimum hardware:

- 1 Megabyte of Memory
- Console terminal
- Emulex MSCP disk controller or host adapter and compatible disk drive

- or -

Non-Emulex MSCP disk controller\* for certain functions

\*Emulex does not support or take responsibility for any operations performed on non-Emulex controllers.

#### **NOTE**

Emulex controllers or host adapters with firmware-resident diagnostics should use those diagnostics and not FVDMS. The firmware-resident diagnostic performs all FVDMS functions. If you attempt to run FVDMS when firmware-resident diagnostics are present, a screen message advises you of their presence and displays a limited menu.

FVDMS is not yet available for other VAX 8000 series systems.

---

### **1.4.2 Software**

---

FVDMS runs under the control of the Emulex VAX Monitor (EVM) and does not require any additional software.

---

## **1.5 Related Documentation**

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The technical manual that accompanies your controller or host adapter contains information you will need. Emulex controller and host adapter technical manuals are available from the address listed below.

TITLE	PUBLICATION NUMBER
EVM User's Guide	VX9950901-00
MicroEVM User's Guide	VX9950910-00
EVM 8600 User's Guide	VX9950924-00
Emulex Removable Disk Drive Packaged Subsystem User's Manual	PE0950901-00
Emulex Removable Disk Drive (Embedded) Packaged Subsystem User's Manual	PE0950902-00
Sabre Packaged Subsystem User's Manual	PE0150901-00
QD01 Disk Controller Technical Manual	QD0151001-00
QD21 Disk Controller Technical Manual	QD2151001-00
QD32 Disk Controller Technical Manual	QD3251001-00
QD33 Disk Controller Technical Manual	QD3351001-00
UD33 Disk Controller Technical Manual	UD3351001-00
DM01 Disk Controller Technical Manual	DM0151001-00
DM02 Disk Controller Technical Manual	DM0251001-00
SC03/MS Disk Controller Technical Manual	SC0351001-00
SC41/MS Disk Controller Technical Manual	SC4151001-00
MD21/S2 Intelligent Host Adapter Technical Manual	MD2151003-00
MD23 Intelligent Host Adapter Technical Manual	MD2351001-00

continued on next page



TITLE	PUBLICATION NUMBER
UC04/M Intelligent Host Adapter Technical Manual	UC0451001-00
UC04/MO Intelligent Host Adapter Technical Manual	UC0451002-00
UC14/M Intelligent Host Adapter Technical Manual	UC1451001-00
UC14/MO Intelligent Host Adapter Technical Manual	UC1451002-00

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## 2.1 Overview

---

This section describes the functions of the FVDMS formatter, procedures for using FVDMS, and its operations and options.

---

## 2.2 Program Description

---

This section briefly describes FVDMS and its conventions.

---

### 2.2.1 FVDMS Functions

---

The basic application of FVDMS is in preparing MSCP disk drives for use in your system. Before a drive can be used, your CPU must recognize the Emulex controller or host adapter and the disk drive. Further, the disk must be formatted and any bad blocks identified. The operations FVDMS performs during disk preparation are described in subsection 2.4.

FVDMS provides options that allow you to initiate these functions. You use NOVRAM configuration options to set and review your drive parameters. Several format options are available for drive preparation. The procedures in subsection 2.3 explain the choices you have and which options you use. The options are described in subsection 2.5.

---

### 2.2.2 Supported Drives

---

This diagnostic supports drives which are compatible with MSCP disk controllers. For a list of drives supported by a particular MSCP disk controller, see the controller's manual. (Emulex MSCP disk controller manuals are listed in subsection 1.5, Related Documentation.)

---

### 2.2.3 FVDMS Conventions

---

FVDMS uses the following keyboard conventions:

<return>	required to terminate operator inputs
<Ctrl C>	returns to EVM> prompt--enter <b>CONT</b> to continue operation
	--enter <b>ABORT</b> to abort operation

---

## 2.3 Procedures

---

This section describes the procedures you can use to perform FVDMS functions. Some procedures use options from the FVDMS main menu. These options are described in subsection 2.5.

---

### 2.3.1 Load and Start FVDMS

---

FVDMS runs under the control of the Emulex VAX Monitor (EVM). Before you can use FVDMS, you must start EVM. The procedure used to invoke EVM and load programs varies from one VAX system to another. For a description of EVM bootstrapping and program-running procedures, see the EVM or uEVM User's Guide, referenced in subsection 1.5.

Once EVM is running, load FVDMS. To do so, type:

```
EVM>      L FVDMS
```

You can now use the EVM SET CONFIG option to set the controller address and vector. The default is 760334. If you wish to make changes, you must do so prior to running FVDMS.

When the SET CONFIG command is complete, the EVM or uEVM prompt reappears on the screen. At this point, you can start FVDMS. To do so, type:

```
EVM>      ST
```

FVDMS identifies itself. Then, if it finds an MSCP disk controller at the address specified with EVM or uEVM SET CONFIG, it displays the menu options. The menu appears as follows:

#### Program Option Menu

- 1 = Quit.
- 2 = Format.
- 3 = Format and Verify.
- 4 = Verify.
- 5 = Read Only Check.
- 6 = List Known Units.
- 7 = Replace block.
- 8 = Edit / Load Novram.
- 9 = Display Novram.

Enter desired option number:

This menu shows all available FVDMS options. Note that the Format, Format and Verify, Edit / Load NOVRAM, and Display NOVRAM options are available for Emulex controllers and host adapters only. Further, all menu and option features may not be available on all of the device types that FVDMS supports. In these cases, FVDMS either does not offer the option in the menu or the feature when the option is invoked, or displays a screen message when an unsupported operation is initiated.

---

If no MSCP disk controller is found, FVDMS terminates and EVM resumes control. When the EVM prompt displays, load FVDMS again. Then use EVM SHOW CONFIG and SET CONFIG commands to review and change the controller address and vector. When these are set appropriately, restart FVDMS.

---

### 2.3.2 Format & Verify Drive

---

The steps involved in disk preparation are formatting the drive and then verifying that each logical block is good. If any bad blocks are found during the format operation, you can replace them, so that the disk surface is ready to accept data. There are two ways you can do this: automatically and manually.

Automatic replacement, or blanket bad block replacement, is a feature of several FVDMS options. With this feature, you can format a drive, verify, and replace any bad blocks in one step. During this format/verify operation, bad blocks are displayed in logical block number (LBN) format. If replacement is enabled, the blocks are replaced automatically.

Manual bad block replacement is a separate option (Option 7). This option allows you to identify specific bad blocks to be replaced. In addition, you can identify the blocks in Bytes From Index (BFI) format or in LBN format. Using BFI format eliminates the calculation required for LBN. This is most often useful in replacing blocks identified in the manufacturer's defect list.

BFI replacement must be done before any LBN replacement. Once LBN replacement occurs, the BFI values are no longer valid.

There are several ways you can use FVDMS options to format and verify your disk. The method you choose depends on whether you:

- have formatted this disk
- want to replace blocks using BFI or LBN information
- want to preserve data on this disk

Each method is described below. The options listed are on the FVDMS main menu. Use them in the order they are listed.

If this is the initial format of the disk and you want to replace LBN only, use:

- Option 3, Format and Verify with replacement enabled

If this is the initial format of the disk and you want to replace manufacturer's detected defects only, use:

- Option 2, Format
- Option 7, Replace Block using BFI format
- Option 4, Verify with replacement enabled

If this disk is formatted and you want to preserve data and obtain a list of bad blocks, use:

- Option 5 with replacement disabled

---

### **2.3.3     Configure NOVRAM**

---

The CPU knows about the controller and drives you add to your system because of information about them that you put into the NOVRAM. FVDMS allows you to review and change this information. To review the current NOVRAM configuration, use Option 9. To change the values, use Option 8. The parameter values in decimal are listed in the Disk Drive Configuration Appendix of your controller or host adapter technical manual.

---

### **2.3.4     Abort Operation**

---

To abort an operation in progress, use <Ctrl C>. The EVM prompt then displays. At this point, enter **ABORT** to abort the operation.

A minimum delay of 10 seconds may occur between the <Ctrl C> and the next display. During some verify operations, the delay may be considerably longer because the abort is delayed until the successful completion of the current command. In this case, a screen message informs you of the delay.

---

### **2.3.5     Terminate FVDMS**

---

To terminate FVDMS, use Option 1, Quit, on the main menu. This will return the EVM prompt. To set another controller address and vector, use the EVM command **SET CONFIG**. See the EVM User's Guide for more information.

---

## **2.4 FVDMS Operations**

---

The two basic operations involved in disk preparation are formatting the disk and then verifying that each logical block is good. The verify operation uses data patterns you selected to run a user-selected number of read/write passes. FVDMS also provides options that allow bad block replacement.

This section provides a brief description of the operations used to analyze the disk surface.

---

### **2.4.1 Format Operation**

---

The Format operation writes sector headers, initializes a drive's RCT tables, and destroys any existing bad block information. It is performed by the Emulex disk controller or host adapter.

---

### **2.4.2 Verify Operation**

---

The verify operation uses the following series of operations (read, write, read, verify loop) to analyze and remove defective logical blocks from the disk. Verify operations are performed on 120 logical blocks at a time. Logical blocks are referenced by logical block number (LBN).

---

#### **2.4.2.1 Read**

---

The entire surface of the disk is first read to find any blocks with header or data ECC errors using the last data pattern written on the disk. This clears any errors which occurred during system operation. Errors may occur because of a grown defect or because of sensitivity to a data pattern not previously used. FVDMS displays the logical block number (LBN) of any blocks that cannot be read due to header or data field errors. If replacement is enabled, FVDMS replaces the block(s) in error.

This pass occurs only once at the start of the verify option.

---

#### 2.4.2.2 Write

---

When the initial Read pass is completed, FVDMS switches to Write mode. During the Write pass, the program writes the entire disk with a pattern from a list you entered. FVDMS displays the LBN of any blocks that cannot be written due to header or data field errors. If replacement is enabled, FVDMS replaces the block(s) in error.

---

#### 2.4.2.3 Read

---

When the Write pass is finished, FVDMS again Reads the entire disk using the last data pattern written. FVDMS displays the LBN of any blocks that cannot be read due to header or data field errors. If replacement is enabled, FVDMS replaces the block(s) in error.

---

#### 2.4.2.4 Verify Loop

---

When each entire Write/Read pass is finished, FVDMS checks to see if any blocks were replaced during that pass. If so, the program displays the number of blocks replaced and reruns the pass with the same data pattern. This ensures that replacement blocks are tested with the failing data pattern.

If no errors occurred, FVDMS checks for another pattern to run. If all patterns have been run, it checks to see if the requested number of passes have been run. If not, the program starts the next Write/Read pass with the first data pattern in the list. When all passes are complete, FVDMS displays the list of all blocks that were replaced during the Verify pass and waits for operator input.

---

### 2.5 FVDMS Options

---

This section describes the function of each option on the FVDMS main menu. The main menu and each submenu prompt for required input. When you enter a valid selection, the next menu displays or FVDMS performs the selected option. If you make an invalid entry, FVDMS rejects it, displays an error message, and reprompts.

In this section, operator responses to FVDMS prompts appear in **bold print**. The symbol **<return>** indicates the carriage return key. The symbol **<Ctrl C>** indicates the Ctrl key and the letter C pressed at the same time.

Based on the nature of the MSCP emulation being performed, some operations may produce an observable delay when performed on previously unformatted drives. This delay is approximately 30 seconds.

When an option is finished, FVDMS waits for you to press any key before returning to the main menu.



---

**2.5.1      Option 1 - Quit**

---

The Quit option returns you to the EVM prompt and EVM resumes control. At this point, you can enter **ABORT** to abort FVDMS.

---

**2.5.2      Option 2 - Format [Supported on Emulex Controllers ONLY]**

---

The Format option is used to initially format a drive. The operation writes sector headers, initializes the drive's RCT tables, and destroys any bad block information previously contained on the disk. It is used to format a virgin drive, a drive that has been determined to contain unusable data, or a drive with a format that is improper to use with a particular controller.

During the format operation for IOMEGA drives only, you are asked whether you want to disable ECC and the post-CRC check. Emulex recommends enabling both of these features. While this reduces the transfer speed, it increases data integrity. Interleave and dwell time settings are factory-set at the optimum value and cannot be changed.

After formatting, the drive contains a valid RCT with a serial number you specified.

Use this option if you plan to manually replace bad blocks identified on the manufacturer's defect list. See subsection 2.3.2 for more information.

---

**2.5.3      Option 3 - Format and Verify [Supported on Emulex Controllers ONLY]**

---

This option formats a drive, then exercises the surface to replace defective sectors. It performs both of the operations that are available separately with options 2 (Format) and 4 (Verify). This option also offers a bad block replacement feature, which, when enabled, replaces any bad blocks found during the format operation.

Use this option if you do not plan to manually replace bad blocks identified in the manufacturer's defect list. See subsection 2.3.2 for more information.

---

#### 2.5.4 Option 4 - Verify

---

The Verify option Write/Read exercises all user-available blocks. FVDMS asks if the list of available patterns is to be displayed. If yes, the list of available patterns displays. If no, or after the list of patterns, FVDMS prompts for the desired pattern.

Each data pattern is run until error-free for a single pass. When a block is encountered that cannot be accessed because of header or data field errors, the Logical Block Number in error displays. Because the failing pattern may not be the first pattern, it is possible that replacement blocks may not be tested with all patterns. For this reason, Emulex recommends running at least two Verify passes over all 16 data patterns.

The Verify option also offers a bad block replacement feature, which, when enabled, replaces any bad blocks by the technique appropriate to the attached controller.

Use this option if you plan to manually replace the bad blocks identified in the manufacturer's defect list. See subsection 2.3.2 for more information.

Example:

```
Enter logical unit number to run: 1

Pattern # 0 = 021516 021506 021570
.
.
.
Pattern # 15 = All 0's
Pattern # 16 = Run patterns 0 thru 15

Enter up to 16 patterns each separated by a space (default = 16):

Enter number of verify passes (default = 2):
Do you want to replace bad blocks found (default = Yes)?

Starting verify...
```

---

**2.5.5      Option 5 - Read Only Check**

---

This option causes all the user-available blocks on the selected drive to be Read-only, not Write/Read, during the Verify pass. When a block is encountered that cannot be accessed because of header or data field errors, the Logical Block Number in error displays.

The Read Only Check option also offers a bad block replacement feature, which, when enabled, replaces any bad blocks by the technique appropriate to the attached controller. Because FVDMS runs with ECC disabled and does not cache any read data, no corrected data is available to put in the replacement block. This means that even though the defective block is replaced and no forced error flag is set in the replacement sector, the data is non-valid.

**CAUTION**

This may cause problems if the replaced blocks contain executable program files. For this reason, you should back up sensitive data before running this option with the replacement feature enabled.

This option is usually used after the drive is formatted. However, if you plan to manually replace the bad blocks identified in the manufacturer's defect list, be certain to do so before using Option 5 with replace enabled. See subsection 2.3.2 for more information.

---

**2.5.6      Option 6 - List Known Units**

---

This option causes the program to list all the drives that are configured in either the NOVRAM or controller configuration switches. Only those units that can be selected by the controller are listed as available.

A user size (in 512-byte blocks) and a media type I.D. are listed with all drives found by this option. The user size does not include RCT area, diagnostic cylinders, designated or hidden spare tracks or blocks, etc.

---

### **2.5.7      Option 7 - Replace Block**

---

This option allows you to replace a specific bad block or group of blocks without using the blanket replacement feature found in the Verify and Read Only options. You choose to identify either logical blocks (entered in decimal MSCP Logical Block Number format) or Bytes From Index (as listed in the manufacturer's defect list), then enter a list of blocks to be replaced. This list can be reviewed and changed as needed. When it is complete, you initiate replacement and FVDMS goes through the list and performs the replacement.

BFI replacement eliminates the calculation required to translate BFI to LBN format. FVDMS requires the defect's cylinder, track, bytes from index, and length of error for each BFI entry. When you initiate replacement, FVDMS prompts for the number of bytes per track (listed in the drive manual). As soon as you enter this value, FVDMS begins replacing blocks.

LBN replacement allows you to replace blocks identified as bad during the format operation, when they are identified in LBN format by older versions of DEC operating systems which do not support host-initiated replacement.

If you are using both types of replacement, BFI replacement must be complete before LBN replacement is begun. Further, BFI replacement must be complete before the blanket bad block replacement feature of other options is enabled.

Emulex recommends that you run the Verify option after the replacement option is complete. This runs test patterns that may detect any pattern-sensitive blocks.

The Replace Block option is not supported for IOMEGA drives, floppy disk drives, drives equipped with ADAPTEC SCSI controllers, or the Emulex SABRE and MEDLEY subsystems.

---

### **2.5.8      Option 8 - Edit / Load NOVRAM [Supported on Emulex Controllers ONLY]**

---

This option allows you to enter the drive configuration parameters into the controller. The current NOVRAM contents are used as default parameters. If the attached controller is a UCxx MSCP-emulating Host Adapter, FVDMS first displays a series of SCSI device type codes to choose from. After you enter a type code, FVDMS displays a menu appropriate to the chosen device type.

If the attached controller is a UCxx MSCP-emulating Host Adapter, FVDMS asks for the SCSI address for each attached SCSI device controller and the logical unit number of each device attached to that SCSI controller. For information on SCSI addressing, refer to the host adapter and SCSI controller manuals. For information on device addressing, refer to the SCSI device controller manual.

FVDMS automatically subtracts both the user-designated spares and the "hidden" spares that are based on controller type, so be sure to use the maximum allowable cylinders, heads, and sectors when prompted. For example, the MD21 Controller (used in EMR) always uses three cylinders as hidden spares.

NOVRAM parameter values are listed in your controller manual (see the drive configuration appendix that lists parameter values in decimal). Table 2-1 presents sample NOVRAM values. The values in the sample are those used for the QD21 with Maxtor drives.

Table 2-1. Sample NOVRAM Parameters

Maxtor 170	Maxtor 380	PDM 170	Description
1	1	1	Type Code
1*	1*	1*	Number of Units
34	34	35	Physical Sectors per Track
7	15	8	Physical Heads
1224	1224	1024	Physical Cylinders
1	1	1	Spare Sectors per Track
2	2	2	Spare Cylinders
0	0	0	Split Code
0	0	0	Removable Media Flag
3086	3086		Gap 0 Parameter
6682	6682		Gap 1 Parameter
3095	3095		Gap 2 Parameter
1	1	1	Sector Zero Offset

\* The number of units will, of course, vary by individual application.

### 2.5.9

#### Option 9 - Display NOVRAM [Supported on Emulex Controllers ONLY]

This option displays the current contents of the NOVRAM. If the attached controller is a UCxx Host Adapter, FVDMS first displays the list of SCSI device type codes.



---

## **3.1 Service**

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Emulex thoroughly tests its products. If FVDMS indicates a malfunction with the Emulex hardware in your system, or if you have trouble with FVDMS itself, contact Emulex or its representative.

In the continental United States, Alaska, and Hawaii contact:

Emulex Technical Support  
3545 Harbor Boulevard  
Costa Mesa, CA 92626  
(714) 662-5600 TWX 910-595-2521  
(800) 854-7112 Outside California Only

Outside the United States, contact the distributor from whom the product was initially purchased.

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